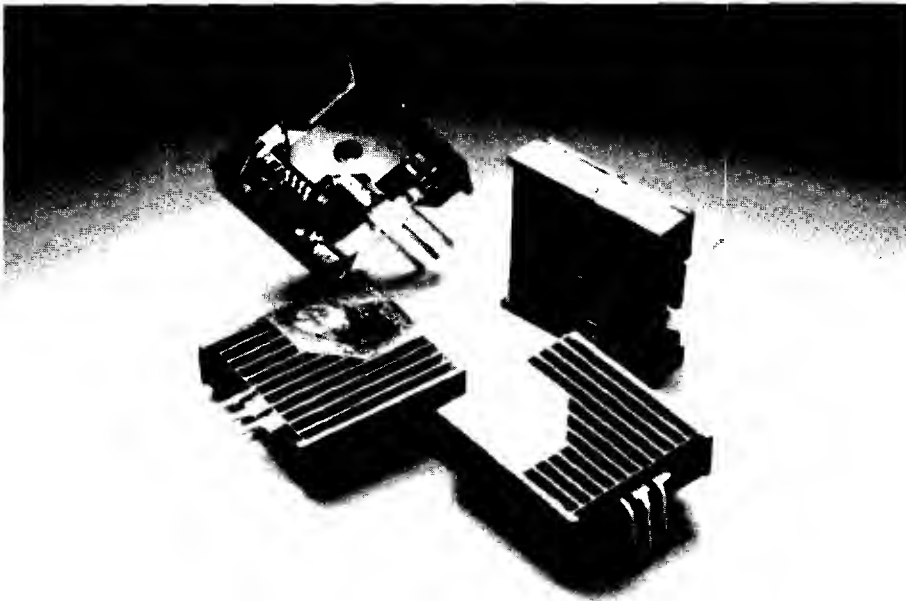


78SR Series

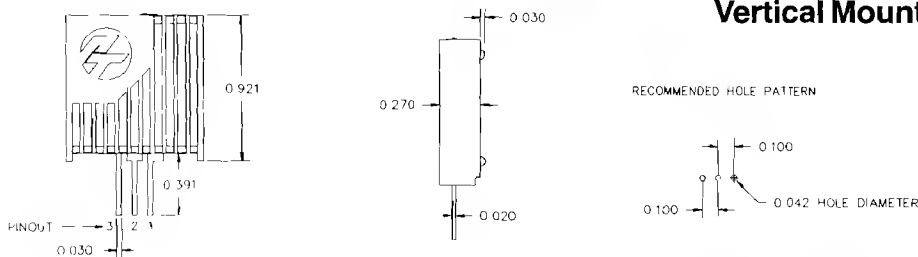
1.5 AMP POSITIVE STEP-DOWN INTEGRATED SWITCHING REGULATOR



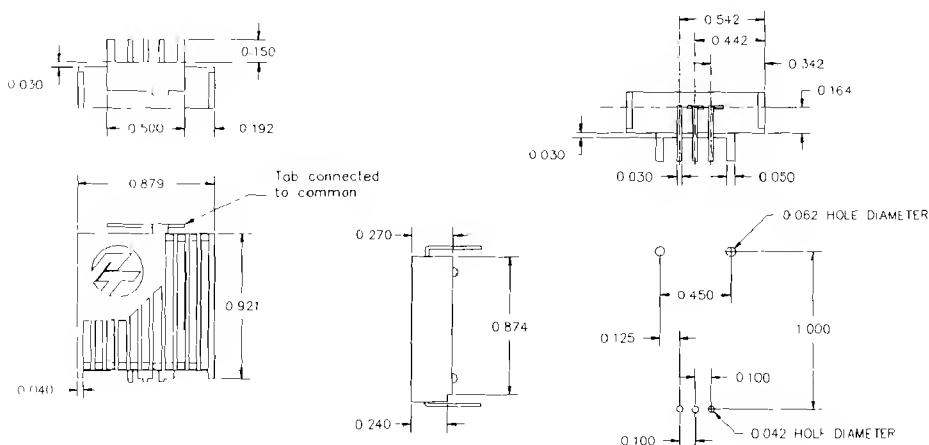
78SR "C" Series is a new line of 3-Terminal Integrated Switching Regulators (ISR's) that are as easy to use as linear 3-terminal regulators. These ISR's have a maximum output current of 1.5 Amps and an output voltage that is laser trimmed to industry standard voltages. They have excellent line and load regulation with internal short circuit and over-temperature protection.

- State-of-the-Art Power Density >90 Watts per Cubic Inch
- High Efficiency >85%
- Self-Contained Inductor
- Internal Short Circuit and Over-Temperature Protection
- Pin Compatible with Existing Linear 3-Terminal, "78" Series Regulators

Vertical Mount



Horizontal Mount



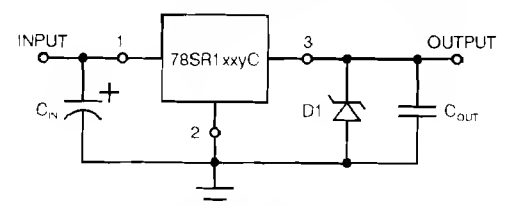
Pin-Out Information

78SR "C" Series Positive Regulators

Pin	1	INPUT	(right)
	2	COMMON	(center)
	3	OUTPUT	(left)

(As viewed from the finned side)

Standard Application



C_{IN} = Optional low ESR electrolytic (10μF)

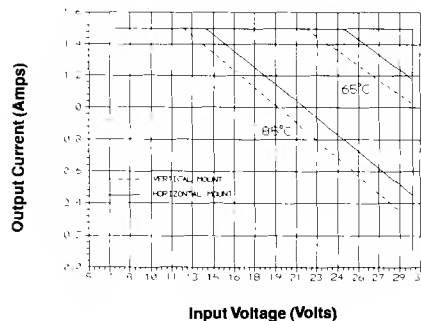
D1 = IN53xxB zener required to clamp turn-on overshoot

C_{OUT} = Optional ceramic (1μF)

Temperature Derating

For small airflow and recommended PCB layout.

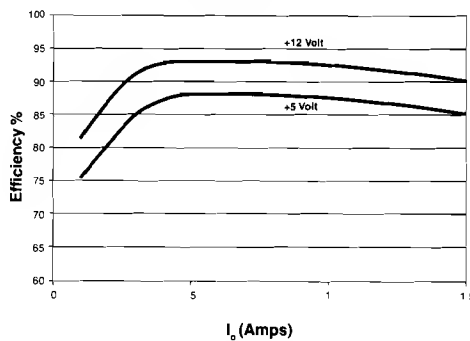
$$@ V_{in} = V_o + 3 \text{ Volts}$$



Performance Data

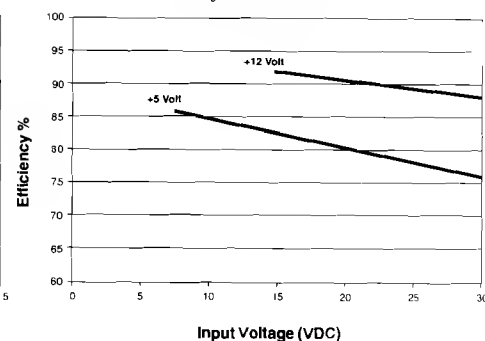
Efficiency vs Load

$$@ V_{in} = V_o + 5 \text{ Volts}$$



Efficiency vs Input Voltage

$$@ I_o = 1.5 \text{ Amp}$$



Specifications

Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	78SR1xxy C			Units
			Min	Typ	Max	
Output Current	I_o	Over V_{in} range	0.1	-	1.5	Amps
Current Limit	I_{cl}	$V_{in} = V_o + 3V$	-	1.8	-	Amps
Short Circuit Current	I_{sc}	$V_{in} = V_o + 3V$	-	3.5	-	Amps
Input Voltage Range	V_{in}	$I_o = 1.5 \text{ Amp}$ $V_o = 5V$ $I_o = 1.5 \text{ Amp}$ $V_o = 12V$	$V_o + 2V$ $V_o + 2.5V$	-	30	Volts
Reflected Ripple	I_{rr}	$V_{in} = V_o + 5V$, $I_o = 1 \text{ Amp}$ $Z_{source} = 1.0\Omega$	-	15	-	mA_{pp}
Static Voltage Tolerance	ΔV_o	Over V_{in} range, $I_o = 1 \text{ Amp}$ $T_a = -40$ to $+65^\circ\text{C}$	-	± 1.0	± 2.0	$\%V_o$
Ripple Rejection	RR	Over V_{in} range	-	45	-	db
Line Regulation	Reg_{line}	Over V_{in} range	-	± 0.2	± 0.4	$\%V_o$
Load Regulation	Reg_{load}	$0.15 \leq I_o \leq 1.5 \text{ Amp}$	-	± 0.1	± 0.2	$\%V_o$
Ripple/Noise	V_n	$V_{in} = 8V$, $I_o = 1.5 \text{ A}$, $V_o = 5V$ $V_{in} = 15V$, $I_o = 1.5 \text{ A}$, $V_o = 12V$	-	50 80	-	mV_{pp}
Transient Response	t_{tr}	50% load change $V_o \leq 1\%$ recovery	-	-	100	μsec
Operating Temperature	T_a	$V_{in} = V_o + 3V$, $I_o = 1.5 \text{ Amp}$	-40	-	+65	$^\circ\text{C}$
Storage Temperature	T_s	-	-65	-	+150	$^\circ\text{C}$
Efficiency	η	$V_{in} = 10V$, $V_o = 5 \text{ Volts}$, $I_o = 1 \text{ Amp}$ $V_{in} = 17V$, $V_o = 12 \text{ Volts}$, $I_o = 1 \text{ Amp}$	-	85 90	-	$\%$
Switching Frequency	f_o	-	-	650	-	KHz
EMI/RFI	-	Over V_{in} range, $I_o = 1.5 \text{ Amp}$	Meets FCC Class B			-
Mechanical Shock	-	-	-	-	50	G's
Weight	-	-	-	0.25 7.0	-	Ounces Grams
Relative Humidity	-	Non-condensing	0	-	95	$\%$

(Specifications subject to change without prior notice)

Ordering Information

78SR1 **xx** **y** C 1.5 Amp Positive Integrated Switching Regulator

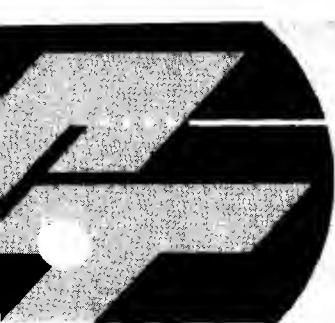
xx = Output Voltage			y = Package Style
33 = 3.3 Volts	06 = 6.0 Volts	12 = 12.0 Volts	V = Vertical Mount H = Horizontal Mount
05 = 5.0 Volts	08 = 8.0 Volts	14 = 13.9 Volts	
53 = 5.25 Volts	09 = 9.0 Volts	15 = 15.0 Volts	



POWER TRENDS

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1991



"78SR" C SERIES 1.5 AMP ISR THERMAL CONSIDERATIONS

The "78SR" C Series Integrated Switching Regulator (ISR) by Power Trends is protected from thermal overload by an internal over-temperature shutdown circuit. The ISR will operate at ambient temperatures as high as 85 °C, but requires derating of either the input voltage and/or output current to do so, as shown in Figure 1. Additional cooling air or heatsinking, as described below, will significantly decrease the amount of this derating. Power dissipation in the ISR is directly related to the magnitude of the input voltage and/or output current as shown by the efficiency curves on the data sheet.

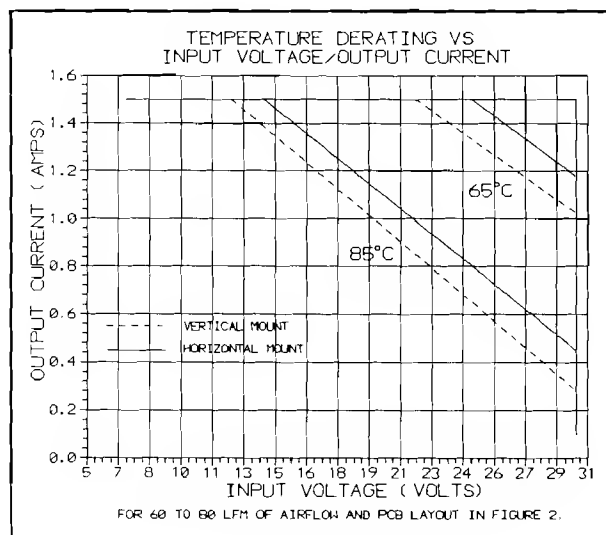


Figure 1

THERMAL SHUTDOWN SEQUENCE

When the junction temperature of the custom IC used in the ISR reaches a temperature of 140 °C, the ISR turns itself off. The ISR will automatically restart when the junction temperature cools to 130 °C. In an extreme environment, where the ambient temperature is too high for the input voltage/output current operating point, the ISR will cycle on and off continuously.

PC BOARD CONSIDERATIONS

The data used to develop Figure 1, was obtained using a 2 oz. single-sided printed circuit board with a foil layout as shown in Figure 2. The ISR is encapsulated in a thermally conductive silicon rubber which provides heat transfer to the thermally conductive plastic case. An internal copper leadframe provides excellent heat transfer to the leads. By simply increasing the copper area of the PC board attached to the leads, such as is shown in Figure 2, the ISR will conduct a significant amount of heat out through the leads using the PC board copper as a heatsink.

RECOMMENDED PC BOARD LAYOUT FOR ISR

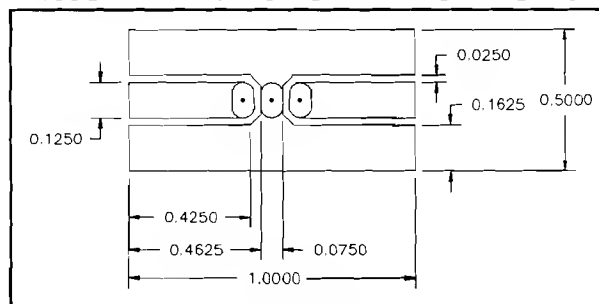


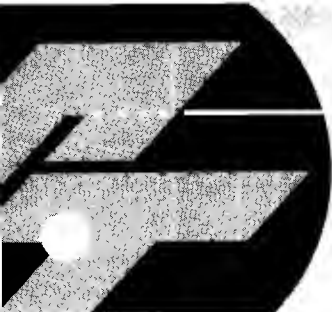
Figure 2

AIRFLOW CONSIDERATIONS

The 60 to 80 LFM noted in Figure 1 is just enough airflow to keep the air surrounding the ISR at a constant temperature, but not enough to cool it. Increasing the airflow will increase the operating range of the ISR. Airflow above 100 LFM across the ISR will dramatically improve the operating input voltage/output current/ambient temperature characteristics shown in Figure 1.

HEATSINK CONSIDERATIONS

The operating range of the ISR can be increased by using a heatsink. This can be accomplished by clamping the face (side without fins) of the ISR to a heatsink or other heat conducting surface.



RELIABILITY 78SR SERIES 1.5 AMP ISR

Power Trends' Integrated Switching Regulators (ISR's) are designed for long reliable operation by using conservative derating factors and integral over-current and over-temperature protection. The ISR circuit utilizes a "buck" regulator topology, as shown in Figure 1. The calculations used to determine the Mean Time Between Failure (MTBF) are based on MIL-STD-217F and are conservative. Under normal operating conditions, the ISR has a calculated MTBF of over 1,000,000 hours.

**78SR SERIES ISR
BLOCK DIAGRAM**

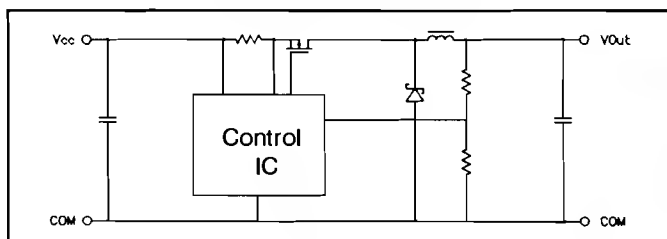


Figure 1

Construction - Power Trends' ISR is an assembly of 12 surface mount components and one integrated magnetic inductor mounted on a printed circuit board made from FR-4 material. A tin-plated, copper leadframe is soldered to the opposite side of the PC board using a high temperature solder. This leadframe is used for the power connections to the ISR. This assembly is then mounted into a plastic case, which is filled with a silicon based, thermally conductive potting compound, and sealed with a case lid. The case is molded from a high temperature plastic which is resistant to all solvents except 1,1,1 trichlorethane.

Components - All of the components used in the ISR are shown in Table 1. The components are the highest quality commercial/industrial parts available. Also shown are the components' operating characteristics and stress factor(s) when operating in a +5 VDC ISR with an input voltage of +30 VDC and an output current of 1.5 Amps. This is the worst-case operating stress that the unit will experience.

78SR SERIES 1.5 AMP ISR's SAMPLE STRESS EVALUATION			
Description	Device Rating	Maximum Operating Condition	Stress Factor
Input Capacitor	50 VDC	30 VDC	0.600
Output Capacitor	25 VDC	5 VDC	0.200
Stability Capacitors	50 VDC	2.5 VDC	0.050
Output Rectifier	40 VDC	30 VDC	0.750
	5A Avg	1.2A Avg	0.240
Power Transistor	50 VDC	30 VDC	0.600
	9.9 ADC 40A Pulse	2A Peak	0.050
	42 W	0.79 W	0.020
Voltage Divider and Frequency Resistor	100 VDC	2.5 VDC	0.025
	62.5 mW	0.125 mW	0.002
Current Sense Resistor	200 VDC	0.25 VDC	0.001
	125 mW	35 mW	0.280
Inductor	150°C	-	-
Custom IC	40 VDC	30 VDC	0.750

Table 1

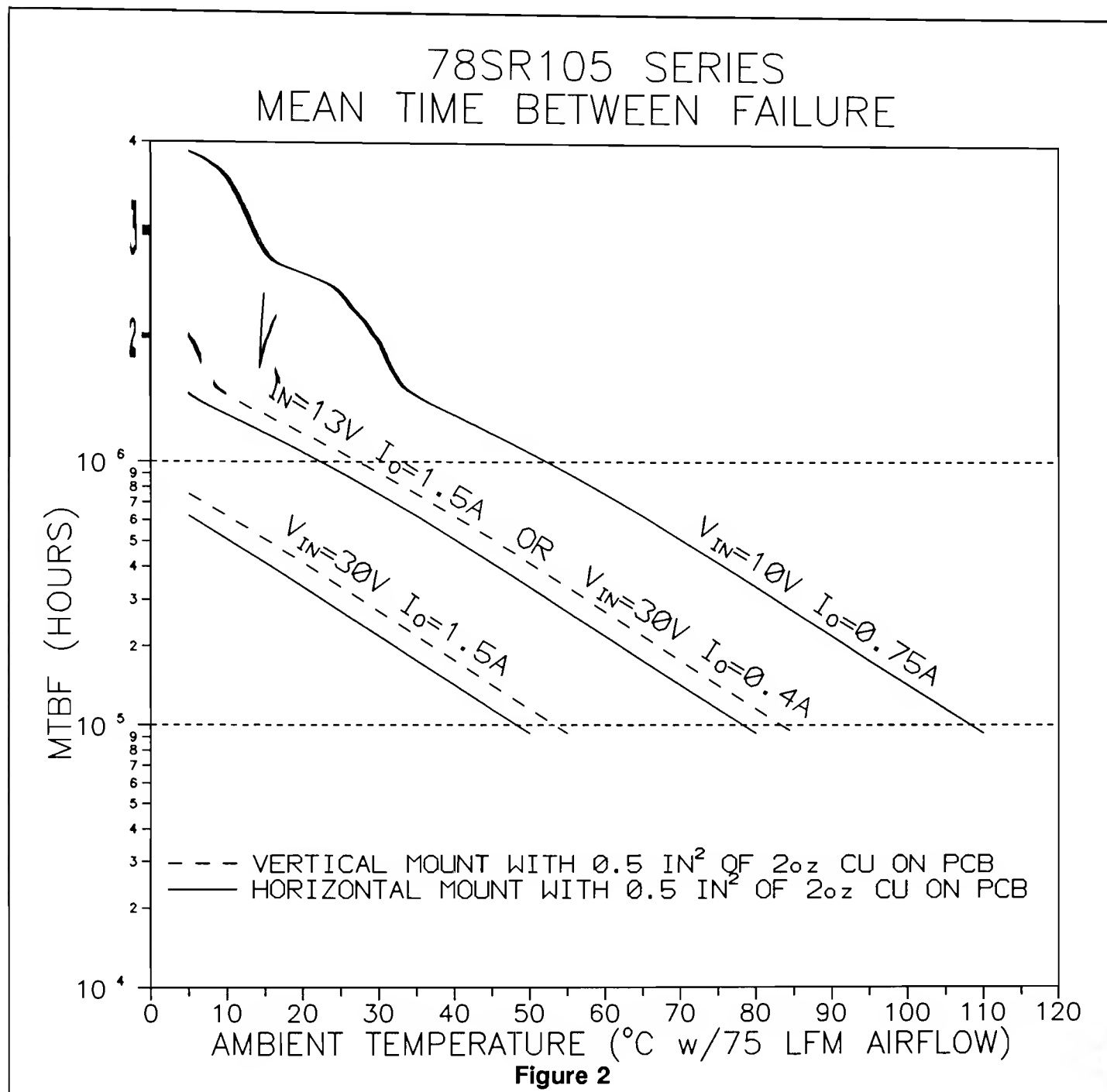
MTBF versus ambient temperature shown in Figure 2. The environmental conditions are assumed to be ground benign. The quality factor derating multiplier for commercial, plastic case components was used.

Junction Temperature vs Operating Temperature

The internal junction temperature of the components is dependent on the operating environment and conditions. The temperature rise between the internal IC and the surrounding ambient air, without heatsinking, is

ground lead and the horizontal mounting tab are soldered to 3 to 5 square inches of copper in the ground plane. This provides an effective heatsink for the ISR and will substantially decrease its junction temperature and thereby increase its reliability.

Demonstrated MTBF - Empirical verification of the computed MTBF has continued since product introduction with no failures in over 750,000 device hours of operation with a 24 volt input and a load of 1.5 amps.





POWER TRENDS

+5 to +12 VOLT/3 WATT STEP-UP INTEGRATED SWITCHING REGULATOR

The *Power Trends*' **88SR112yD** Series is a new 3-Terminal Integrated Switching Regulator (ISR) designed for use on PC boards wherever regulated +12 volts is required with up to 3 watts of output power. It is ideal for applications using a 7.2 volt battery as a main power source. This ISR has a maximum output current of 100 mAmps at an input voltage of 4.5 volts and 250 mAmps at an input voltage of 5.6 volts. The output voltage is laser trimmed and it has excellent line and load regulation. Other outstanding features include:

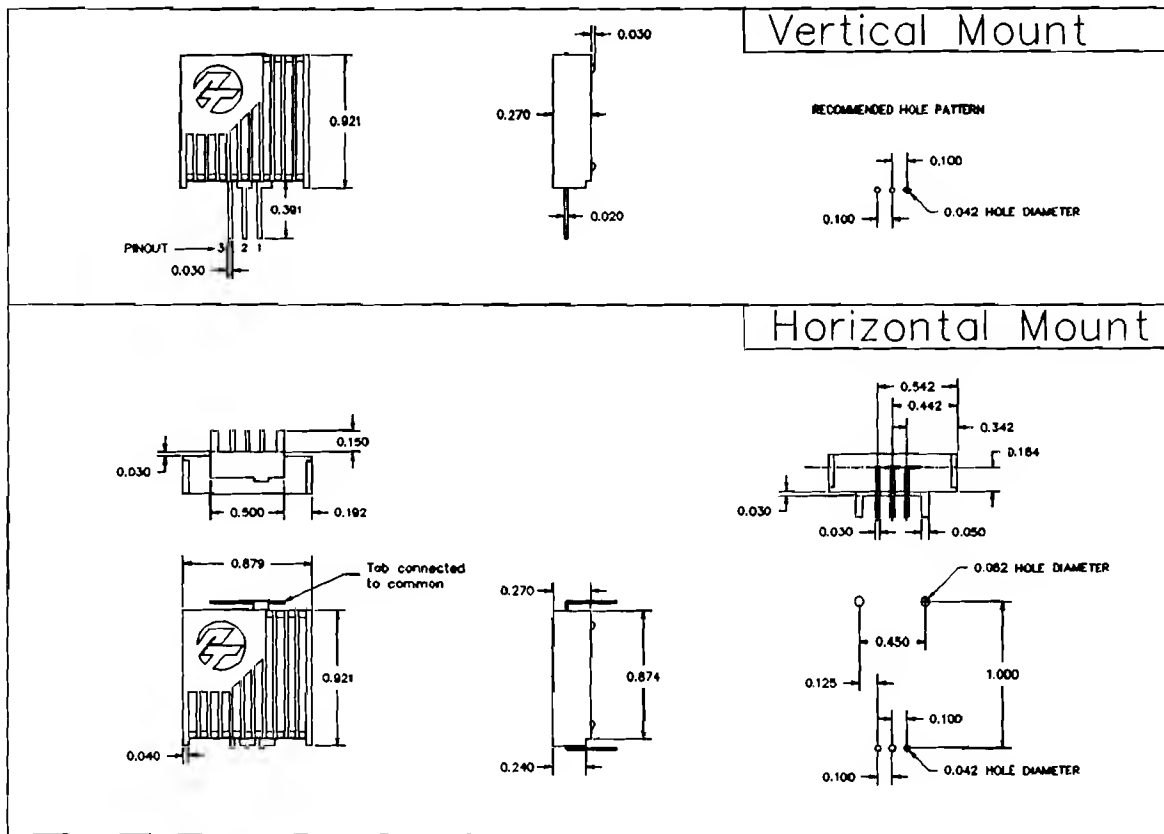
- Wide Input Voltage Range
+5 to +11 Volts
- High Efficiency > 80%
- Self-Contained Inductor
- Internal Over-Temperature Protection
- 1.1 MHz Switching Frequency

ELECTRICAL SPECIFICATIONS

Characteristics ($T_a=25^\circ\text{C}$ unless noted)	Symbols	Conditions ($V_o = +12\text{ Volts}$)	88SR112yD			Units
			Min	Typ	Max	
Output Current	I_o	Over V_{in} range	50	-	250	mAmps
Minimum Input Voltage	$\text{Min } V_{in}$	$I_o=100\text{ mAmp}$	-	4.5	4.8	VDC
		$I_o=150\text{ mAmp}$	-	4.7	5.0	VDC
		$I_o=250\text{ mAmp}$	-	5.6	6.0	VDC
Maximum Input Voltage	$\text{Max } V_{in}$	Over I_o range	-	11.0	-	VDC
Static Voltage Tolerance	V_o	Over V_{in} range $T_a=-40$ to $+65^\circ\text{C}$	-	± 1.0	± 2.0	$\%V_o$
Ripple Rejection	RR	Over V_{in} range @ 120 Hz	-	45	-	dB
Line Regulation	Reg_{line}	Over V_{in} range	-	-	± 0.6	$\%V_o$
Load Regulation	Reg_{load}	$50 \leq I_o \leq 250\text{ mAmp}$	-	-	± 1.0	$\%V_o$
Ripple/Noise	V_n	$V_{in}=+5\text{V}$, $I_o=100\text{ mAmp}$	-	30	-	mV_{pp}
Transient Response	t_{ir}	0.1A to 0.2A step, $V_{in}=8\text{V}$, $V_o \leq 1\%$ recovery	-	200	-	μSec
	V_{max}			200		mV
Efficiency	η	$V_{in}=7.0\text{V}$, $I_o=200\text{ mAmp}$	-	87	-	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	1.0	1.1	1.2	MHz

MECHANICAL SPECIFICATIONS

Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions ($V_o = +12\text{ Volts}$)	88SR112yD			Units
			Min	Typ	Max	
Operating Temperature	T_a	Over V_{in} and I_o ranges	-40	-	+65	$^\circ\text{C}$
Temperature Coefficient	TC	Over V_{in} and I_o ranges	-	TBD		$\text{mV}/^\circ\text{C}$
Storage Temperature	T_s		-65	-	150	$^\circ\text{C}$
Mechanical Shock			-	-	50	G's
Weight			-	7.3	-	grams
Relative Humidity			0	-	95	%



PIN-OUT INFORMATION (As viewed from the finned side)	
Pin 1	INPUT (right)
2	COMMON (center)
3	OUTPUT (left)

ORDERING INFORMATION 88SR1xyD	
xx = Output Volts	y = Package Style
12 = 12.0 Volts	V = Vertical H = Horizontal



POWER TRENDS

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POWER TRENDS

+3.3 VOLT/1.5 AMP STEP-DOWN INTEGRATED SWITCHING REGULATOR

The 78ST133yC is a new +3.3 Volt, 3-Terminal, Integrated Switching Regulator (ISR) that is as easy to use as a linear regulator. It is designed to power new low power "3 Volt" logic systems and microprocessors. These ISR's have a maximum output current of 1.5 Amps and an output voltage that is laser trimmed. They have excellent line and load regulation. Other outstanding features include:

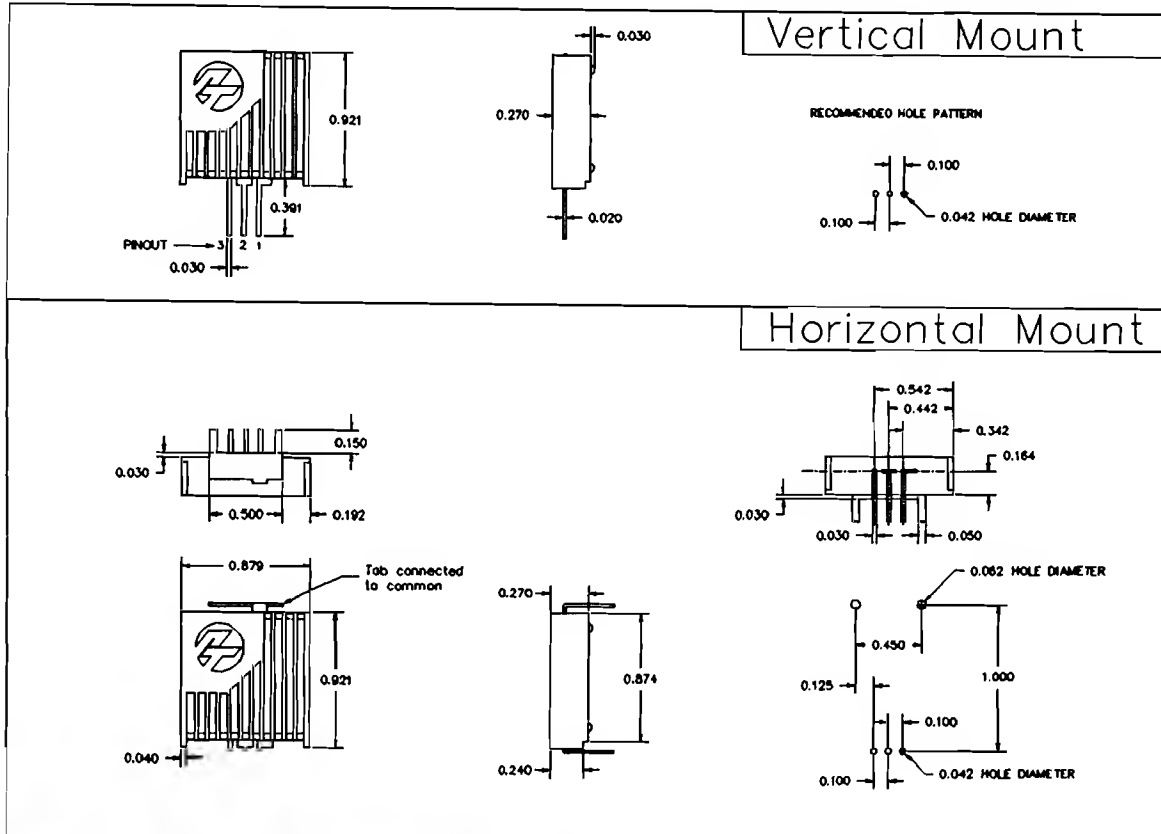
- State-of-the-Art Power Density
> 25 Watts per Cubic Inch
- High Efficiency > 80%
- Self-Contained Inductor
- Internal Short Circuit and
Over-Temperature Protection
- Pin Compatible with Existing
Linear 3-Terminal, "78" Series Regulators

ELECTRICAL SPECIFICATIONS

Characteristics ($T_a=25^\circ\text{C}$ unless noted)	Symbol	Conditions	78ST133yC			Units
			Min	Typ	Max	
Output Current	I_o	Over V_{in} range	0	-	1.5	Amps
Current Limit	I_{cl}	$V_{in}=7\text{V}$	1.6	1.8	2.0	Amps
Short Circuit Current	I_{sc}	$V_{in}=7\text{V}$	-	2.4	-	Amps
Input Voltage Range	V_{in}	$I_o=1\text{ Amp}$, $V_o=3.3\text{V}$	6	-	20	VDC
Reflected Ripple	I_{rr}	$V_{in}=V_o+5\text{VDC}$, $I_o=1\text{ Amp}$ $Z_{source}=1.0\Omega$	-	15	-	$\text{mA}_{pp}@1\text{MHz}$
Static Voltage Tolerance	V_o	Over V_{in} range, $I_o=1\text{ Amp}$ $T_a=-40\text{ to }+65^\circ\text{C}$	-	± 1.0	± 2.0	$\%V_o$
Ripple Rejection	RR	Over V_{in} range @ 120 Hz	-	60	-	dB
Line Regulation	Reg_{line}	Over V_{in} range, $I_o=1.5\text{ Amp}$	-	± 0.2	± 0.4	$\%V_o$
Load Regulation	Reg_{load}	$0.15 \leq I_o \leq 1.5\text{ Amp}$	-	± 0.1	± 0.2	$\%V_o$
Ripple/Noise	V_n	$V_{in}=8\text{V}$, $I_o=1.5\text{ Amp}$, $V_o=3.3\text{V}$	-	50	-	mV_{pp}
Transient Response (with 100 μF output cap)	t_{tr}	50% load change $V_o \leq 1\%$ recovery	-	50	-	μSec
Efficiency	η	$V_{in}=10\text{V}$, $I_o=1.0\text{ Amp}$, $V_o=3.3\text{V}$	-	80	-	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	-	650	-	KHz
EMI/RFI	-	Over V_{in} and I_o ranges	Meets FCC Class B			

MECHANICAL SPECIFICATIONS

Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	78ST133yC			Units
			Min	Typ	Max	
Operating Temperature	T_a	Over V_{in} and I_o ranges	-40	-	+65	$^\circ\text{C}$
Storage Temperature	T_a		-65	-	150	$^\circ\text{C}$
Mechanical Shock			-	-	50	G's
Weight			-	7.0	-	grams
Relative Humidity			0	-	95	%



PIN-OUT INFORMATION (As viewed from the finned side)	
Pin 1	INPUT (right)
Pin 2	COMMON (center)
Pin 3	OUTPUT (left)

ORDERING INFORMATION 78ST1xyC	
xx = Output Volts	y = Package Style
33 = 3.3 Volts	V = Vertical H = Horizontal

Important Note: For proper operation, the 78ST133yC must be used with a 100 μF electrolytic capacitor wired from the output to ground.



POWER TRENDS

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POWER TRENDS

1.5 AMP *NEGATIVE* STEP-DOWN INTEGRATED SWITCHING REGULATOR

The 79SR"C" Series is a line of *Negative Input/Negative Output* 3-Terminal Integrated Switching Regulators (ISR's) that are as easy to use as linear 3-terminal regulators. These ISR's have a maximum output current of -1.5 Amps and an output voltage that is laser trimmed to most industry standard voltages. They have excellent line and load regulation. Other outstanding features include:

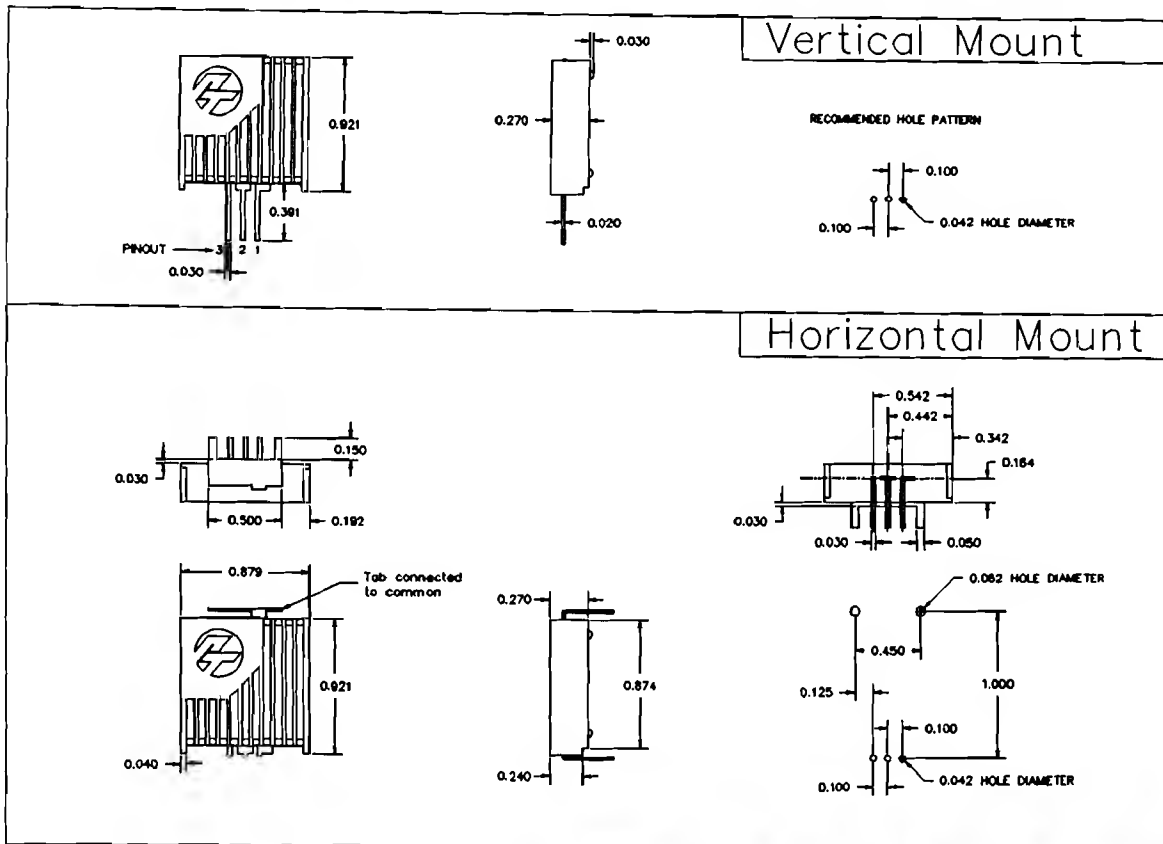
- State-of-the-Art Power Density
> 90 Watts per Cubic Inch
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short Circuit and
Over-Temperature Protection
- Pin Compatible with Existing
Linear 3-Terminal, "79" Series Regulators

ELECTRICAL SPECIFICATIONS

Characteristics ($T_a=25^\circ\text{C}$ unless noted)	Symbol	Conditions	79SR1xxyC			Units
			Min	Typ	Max	
Output Current	I_o	Over V_{in} range	-0.1	-	-1.5	Amps
Current Limit	I_{cl}	$V_{in}=V_o-3V$	-1.6	-1.8	-2.0	Amps
Short Circuit Current	I_{sc}	$V_{in}=V_o-3V$	-	-3.5	-	Amps
Input Voltage Range	V_{in}	$I_o=-0.1$ to -1.5 Amp, $V_o=-5V$ $V_o=-15V$	$V_o-2.5$ $V_o-3.5$	-	-30	VDC
Reflected Ripple	I_{rr}	$V_{in}=V_o-5VDC$, $I_o=-1$ Amp $Z_{source}=1.0\Omega$	-	15	-	$mA_{pp}@$ 1MHz
Static Voltage Tolerance	V_o	Over V_{in} range, $I_o=-1$ Amp $T_a=-40$ to $+65^\circ\text{C}$	-	± 1.0	± 2.0	$\%V_o$
Ripple Rejection	RR	Over V_{in} range @ 120 Hz	-	45	-	dB
Line Regulation	Reg_{line}	Over V_{in} range	-	± 1.0	± 2.0	$\%V_o$
Load Regulation	Reg_{load}	$-0.15 \leq I_o \leq -1.5$ Amp	-	± 0.2	± 0.4	$\%V_o$
Ripple/Noise	V_n	$V_{in}=-15V$, $I_o=-1.0$ Amp, $V_o=-5V$	-	35	-	mV_{pp}
Transient Response	t_{tr}	50% load change $V_o \leq 1\%$ recovery	-	100	-	μSec
Efficiency	η	$V_{in}=-10V$, $I_o=-1.0$ Amp, $V_o=-5V$	-	87	-	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	0.95	1.0	1.05	MHz
EMI/RFI	-	Over V_{in} and I_o ranges	Meets FCC Class B			

MECHANICAL SPECIFICATIONS

Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	79SR1xyC			Units
			Min	Typ	Max	
Operating Temperature	T_a	Over V_{in} and I_o ranges	-40	-	+65	$^\circ\text{C}$
Temperature Coefficient	TC	Over V_{in} and I_o ranges	-	0.5	1.5	$\text{mV}/^\circ\text{C}$
Storage Temperature	T_s		-65	-	150	$^\circ\text{C}$
Mechanical Shock			-	-	50	G's
Weight			-	7.0	-	grams
Relative Humidity			0	-	95	%



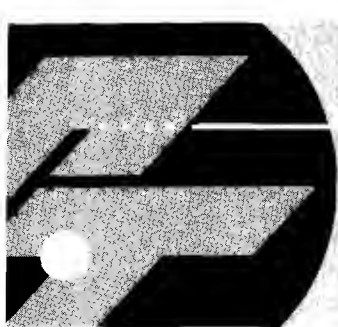
PIN-OUT INFORMATION (As viewed from the finned side)	
Pin 1	COMMON (right)
2	INPUT (center)
3	OUTPUT (left)

ORDERING INFORMATION 79SR1xyC	
xx = Output Volts	y = Package Style
05 = -5.0 Volts	V = Vertical
52 = -5.2 Volts	H = Horizontal
09 = -9.0 Volts	
12 = -12 Volts	
15 = -15 Volts	



POWER TRENDS

1101 North Raddant Road, Batavia, IL 60510 708-406-0900 FAX 708-406-0901



USING THE "78SR" C SERIES 1.5 AMP INTEGRATED SWITCHING REGULATOR (ISR)

The 78SR1xxyC Integrated Switching Regulator (ISR) by *Power Trends* is a complete switch-mode power regulator capable of delivering regulated +3.3, 5, 6, 8, 9, 10, 12, 13.9, or 15 VDC at currents up to 1.5 Amps with input voltages ranging from V_o+2 to +30 VDC for the +5 VDC unit to $V_o+2.5$ to +30 VDC for +12 VDC units and above. The ISR utilizes current mode control in a Buck regulator topology operating at a nominal frequency of 650 kHz.

Input Source Requirements

Power Trends' ISR does not incorporate a "soft start" circuit. This may result in large transient voltages briefly appearing at the output of the ISR (usually less than 100 μ sec) when it is first turned on. To prevent this situation from harming voltage sensitive loads, a 5 watt zener diode, 1N53xxB or equivalent, should be placed across the output terminals of the ISR. This zener will also provide effective over-voltage protection for the load. Also, an electrolytic capacitor can be placed across the input terminals to reduce the amount of "upstream" ripple. In applications with large load transients, a "78ST" series ISR will provide much better transient response.

Battery and Low Input Voltage Operation

Unlike a linear regulator where the output voltage decreases as V_{in} decreases, ISR's have a minimum input voltage threshold. The control IC inside the package will not run below an input voltage of +6 VDC. Between +6 VDC and V_o+2 in ($V_o+2.5$ for +12 VDC and above) the output voltage will be below the specified output voltage and will not be regulated. The actual output voltage will be a function of load and the input voltage.

Ripple and Noise

Typically, the +5 VDC ISR has an output ripple/noise of 50 mV_{pp} (@ $I_o = 1.5$ Amp, $V_{in} = +8$ VDC). This output ripple/noise increases linearly with increasing input voltage. To reduce the amount of output ripple/noise, additional output capacitance may be added directly at the terminals of the ISR only if the capacitors are ceramic and the total capacitance is below 5 μ F. Adding a 1 μ F ceramic capacitor will decrease the output ripple/noise by 33%. An aluminum electrolytic placed at this point may cause the ISR to oscillate. Bypass capacitors (electrolytic or other) placed at least 2" away from the ISR will not affect its operation.

Over-Temperature Protection

When the internal temperature of the ISR reaches 140°C the ISR will automatically shut down. The ISR will automatically restart when the internal temperature cools below 130°C.

Over-Current Protection

Two independent output current detection circuits protect the ISR from damage if the output is over-loaded or shorted. The first circuit limits the output current to a maximum of 2 Amps. The second circuit shuts down the ISR if the output current reaches 3.5 Amps. The unit will automatically restart 10 μ sec after the over-load or short circuit condition is removed.



POWER TRENDS

THE NOTEBOOK COMPUTER POWER CHIP

The *Notebook Computer Power Chip* (p/n 78ST305PC) is a new 3-Terminal Integrated Switching Regulator (ISR) designed for use as the primary +5V power supply in laptop and notebook computers or other battery operated equipment. This ISR has a typical continuous output current of 2 Amps with surge capability of 4 Amps when the recommended PC board layout is used as a heatsink. The output voltage, operating frequency, and current limit are laser trimmed and 100% computer tested. Other outstanding features include:

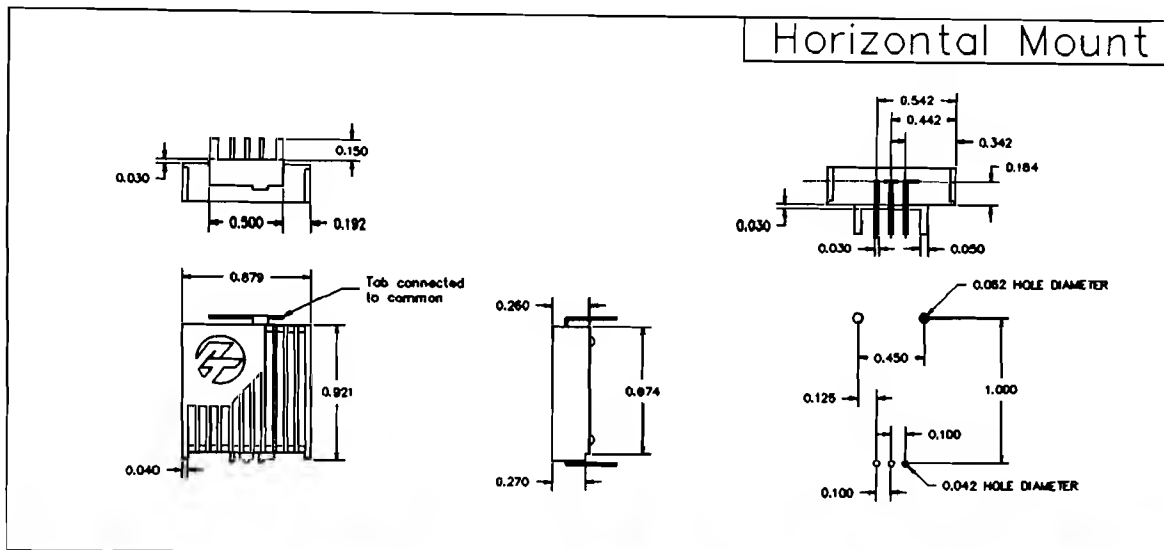
- State-of-the-Art Power Density
> 50 Watts per Cubic Inch
- High Efficiency > 85%
- Self-Contained Inductor
- Internal Short Circuit and
Over-Temperature Protection
- 1 MHz Switching Frequency

ELECTRICAL SPECIFICATIONS

Characteristics ($T_a=25^\circ\text{C}$ unless noted)	Symbols	Conditions	78ST305PC			Units
			Min	Typ	Max	
Output Current	I_o	Over V_{in} range	0	2.0	3.0	Amps
Current Limit	I_{cl}	$V_{in}=V_o+3V$	-	4.0	-	Amps
Short Circuit Current	I_{sc}	$V_{in}=V_o+3V$	-	TBD	-	Amps
Input Voltage Range	V_{in}	$I_o = 0.1$ to 2.0 Amp	6.6	-	20	VDC
Reflected Ripple	I_{rr}	$V_{in}=V_o+5VDC$, $I_o=2$ Amp $Z_{source}=1.0\Omega$	-	TBD	-	$mA_{pp}@$ 1MHz
Static Voltage Tolerance	V_o	Over V_{in} range, $I_o=2$ Amp $T_a=-40$ to $+55^\circ\text{C}$	-	± 1.0	± 2.0	$\%V_o$
Ripple Rejection	RR	Over V_{in} range @ 120 Hz	-	45	-	dB
Line Regulation	Reg_{line}	Over V_{in} range	-	± 1.0	± 2.0	$\%V_o$
Load Regulation	Reg_{load}	$0.1 \leq I_o \leq 2.0$ Amp	-	± 0.2	± 0.4	$\%V_o$
Ripple/Noise	V_n	$V_{in}=+8V$, $I_o=2$ Amp, $V_o=+5V$	-	30	-	mV_{pp}
Transient Response (with 120 μ F output cap)	t_{tr}	50% load change $V_o \leq 1\%$ recovery	-	100	-	μSec
Efficiency	η	$V_{in}=+8V$, $I_o=2$ Amp	-	85	-	%
Switching Frequency	f_o	Over V_{in} and I_o ranges	0.95	1.0	1.05	MHz

MECHANICAL SPECIFICATIONS

Characteristics ($T_a = 25^\circ\text{C}$ unless noted)	Symbols	Conditions	78ST305PC			Units
			Min	Typ	Max	
Operating Temperature	T_a	Over V_{in} and I_o ranges	-40	-	+55	$^\circ\text{C}$
Storage Temperature	T_s		-65	-	150	$^\circ\text{C}$
Mechanical Shock			-	-	TBD	G's
Weight			-	7.0	-	grams
Relative Humidity			0	-	95	%



PIN-OUT INFORMATION (As viewed from the finned side)	
Pin 1	INPUT (right)
2	COMMON (center)
3	OUTPUT (left)

ORDERING INFORMATION 78ST3xxyC	
xx = Output Volts	y = Package Style
05 = 5.0 Volts	P = Plastic Horizontal

Important Note: For proper operation, the 78ST305PC must be used with a $120\mu\text{F}$ electrolytic capacitor wired from the output to ground.



POWER TRENDS

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